What is claimed is:

CLAIMS

1. A unit fuel injector, the injector internally preparing fuel during an injection event at a pressure sufficient for injection by means of an intensifier driven by a pressurized non-fuel actuating fluid selectively ported to the intensifier, comprising;

a selectively actuatable controller interposed in a fuel passage, the fuel passage effecting fluid communication between an intensifier fuel chamber and a needle valve, the controller being shiftable between an open and a closed disposition for selectively opening and closing the fuel passage during the injection event.

2. The unit fuel injector of claim 1 wherein the controller is a two position valve.

3. The unit fuel injector of claim 2 wherein the two position valve is electrically actuated.

4. The unit fuel injector of claim 3 wherein the two position valve is solenoid operated.

5. The unit fuel injector of claim 4 wherein the two position valve is disposable in a first disposition by actuation of the solenoid and is disposable in a second opposed disposition by a spring bias, the solenoid being deactivated.

6. A control apparatus for a unit fuel injector, the injector internally preparing fuel during an injection event at a pressure sufficient for injection by means of an intensifier driven by a pressurized non-fuel actuating fluid selectively ported to the intensifier, comprising;

a selectively actuatable injection timing controller interposed in a fuel passage, the fuel passage effecting fluid communication between an intensifier fuel chamber and a needle valve, the controller being shiftable between an open and a closed disposition for selectively opening and closing the fuel passage during the injection event.

7. The control apparatus of claim 6 wherein the controller is a two position valve.

8. The control apparatus of claim 7 wherein the two position valve is electrically actuated.

9. The control apparatus of claim 8 wherein the two position valve is solenoid operated.

10. The control apparatus of claim 9 wherein the two position valve is disposable in a first disposition by actuation of the solenoid and is disposable in a second opposed disposition by a spring bias, the solenoid being deactivated.

11. A method of injection timing control for a unit fuel injector, the injector internally preparing fuel during an injection event at a pressure sufficient for injection by means of an intensifier driven by a pressurized non-fuel actuating fluid selectively ported to the intensifier, comprising;

interposing a selectively actuatable injection timing controller in a fuel passage, the fuel passage effecting fluid communication between an intensifier fuel chamber and a needle valve; and

shifting the controller being between an open and a closed disposition for selectively opening and closing the fuel passage during the injection event.

12. The method of claim 11 including providing a two position valve to act as the controller.

13. The method of claim 12 including electrically actuating the two position valve.

14. The method of claim 13 including operating the two position valve by means of a solenoid.

15. The method of claim 14 including disposing the two position valve in a first disposition by actuation of the solenoid and disposing the two position valve in a second opposed disposition by a spring bias, the solenoid being deactivated.

16. A timing control mechanism for use with a fuel injector having an intensifier plunger and an intensifier chamber fluidly coupled to a needle valve chamber by a high pressure fuel passage, comprising:

a timing control valve in fluid communication with the high pressure fuel passage and being shiftable between a blocked disposition in which fuel flow in the high pressure

fuel passage is substantially blocked and an unblocked disposition in which fuel flow in the high pressure fuel passage is substantially unrestricted.

17. The timing control mechanism of claim 16, the timing control valve being controlled independently of the intensifier plunger.

18. The timing control mechanism of claim 16, the timing control valve providing an alternative fuel flow-path in fluid communication with the intensifier chamber when the timing control valve is in the blocked disposition.

19. The timing control mechanism of claim 18, the alternative fuel flow path accommodating compressive stroking motion of the intensifier plunger when the timing control valve is in the blocked disposition.

20. The timing control mechanism of claim 18, the alternative fuel flow path being throttled.

21. The timing control mechanism of claim 18, the alternative fuel flow path being in flow communication with a fuel volume at relatively low pressure.

22. The timing control mechanism of claim 16, the timing control valve having a blocking land, the blocking land having an actuation surface, the actuation surface being exposable to the pressure of the fuel in the high pressure fuel passage.

23. The timing control mechanism of claim 22, the blocking land actuation surface being substantially continuously exposed to the pressure of the fuel in the high pressure fuel passage.

24. The timing control mechanism of claim 22, the blocking land substantially blocking fuel flow in the high pressure fuel passage when the timing control valve is in the blocked disposition.

25. The timing control mechanism of claim 16, the timing control valve having an actuation land, the actuation land having an actuation surface, the actuation surface being exposable to the pressure of the fuel in the high pressure fuel passage.

26. The timing control mechanism of claim 25, the actuation land actuation surface having a greater area than a blocking land actuation surface.

27. The timing control mechanism of claim 25, fuel flow to the actuation land actuation surface being throttled through a throttling orifice.

28. The timing control mechanism of claim 16, the timing control valve having a spring, the spring acting on both a first shiftable component and a second opposed shiftable component.

29. The timing control mechanism of claim 28, the spring acting simultaneously to bias a first valve in the unblocked disposition and to bias a second valve in a closed disposition.

30. The timing control mechanism of claim 29, the spring being disposed in a variable volume actuation chamber.

31. The timing control mechanism of claim 30, opening the second valve acting to fluidly vent the variable volume actuation chamber.

32. The timing control mechanism of claim 31, a solenoid and solenoid armature acting on the second valve in opposition to the bias of the spring.

33. The timing control mechanism of claim 31, selective venting of the actuation chamber affecting opposed hydraulic forces acting on the first valve, causing the first valve to selectively shift between the blocked and unblocked dispositions.

34. The timing control mechanism of claim 16 being hydraulically actuated and electronically controlled.

35. The timing control mechanism of claim 34, the hydraulic actuation being effected by fuel pressure.

36. A fuel injector comprising:

an intensifier plunger and an intensifier chamber fluidly coupled to a needle valve chamber by a high pressure fuel passage, comprising:

a timing control valve in fluid communication with the high pressure fuel passage and being shiftable between a blocked disposition in which fuel flow in the high pressure fuel passage is substantially blocked and an unblocked disposition in which fuel flow in the high pressure fuel passage is substantially unrestricted.

37. The fuel injector of claim 36, the timing control valve being controlled independently of the intensifier plunger.

38. The fuel injector of claim 36, the timing control valve providing an alternative fuel flow path in fluid communication with the intensifier chamber when the timing control valve is in the blocked disposition.

39. The fuel injector of claim 38, the alternative fuel flow path accommodating compressive stroking motion of the intensifier plunger when the timing control valve is in the blocked disposition.

40. The fuel injector of claim 38, the alternative fuel flow path being throttled.

41. The fuel injector of claim 38, the alternative fuel flow path being in flow communication with a fuel volume at relatively low pressure.

42. The fuel injector of claim 36, the timing control valve having a blocking land, the blocking land having an actuation surface, the actuation surface being exposable to the pressure of the fuel in the high pressure fuel passage.

43. The fuel injector of claim 42, the blocking land actuation surface being substantially continuously exposed to the pressure of the fuel in the high pressure fuel passage.

44. The fuel injector of claim 42, the blocking land substantially blocking fuel flow in the high pressure fuel passage when the timing control valve is in the blocked disposition.

45. The fuel injector of claim 36, the timing control valve having an actuation land, the actuation land having an actuation surface, the actuation surface being exposable to the pressure of the fuel in the high pressure fuel passage.

46. The fuel injector of claim 45, the actuation land actuation surface having a greater area than a blocking land actuation surface.

47. The fuel injector of claim 45, fuel flow to the actuation land actuation surface being throttled through a throttling orifice.

48. The fuel injector of claim 36, the timing control valve having a spring, the spring acting on both a first shiftable component and a second opposed shiftable component.

49. The fuel injector of claim 48, the spring acting simultaneously to bias a first valve in the unblocked disposition and to bias a second valve in a closed disposition.

50. The fuel injector of claim 49, the spring being disposed in a variable volume actuation chamber.

51. The fuel injector of claim 50, opening the second valve acting to fluidly vent the variable volume actuation chamber.

52. The fuel injector of claim 51, a solenoid and solenoid armature acting on the second valve in opposition to the bias of the spring.

53. The fuel injector of claim 51, selective venting of the actuation chamber affecting opposed hydraulic forces acting on the first valve, causing the first valve to selectively shift between the blocked and unblocked dispositions.

54. The fuel injector of claim 56 being hydraulically actuated and electronically controlled.

55. The fuel injector of claim 54, the hydraulic actuation being effected by fuel pressure.